maximize coding efficiency while dealing with the diversification of network types and their characteristic formatting and loss/error robustness requirements.

Recently, the MPEG-4 Visual standard has also begun to emerge in use in some application domains of the prior coding standards. It has provided video shape coding capability, and has similarly worked toward broadening the range of environments for digital video use.

However, the video schemes available today have in common, that it is difficult to adapt an already coded video stream during its way from its creation to the arrival at a receiver in order, for example, to adapt the performance level of the coded video stream to the performance of the receiver or to the performance of the transmission link connecting the coded video streams source and the receiver.

For example, a MPEG-4 data stream may be provided at a video server in Dolby surround, thus providing a relatively large number of audio channels. However, the receiver may be a device capable of only reproducing mono-audio information. In this case, transferring the video-coded stream with full performance level, i.e. incorporating all audio channels, would mean waste of transfer-linked capacity. Thus, it would be advantageous if a gateway between the coded video stream source and the receiver could convert the coded video stream from its initial performance level to a lower performance level. However, in available video coding schemes, the gateway may not convert a video data stream from a higher performance level to a lower performance level merely by discarding the portion of the coded video data stream pertaining the excessive channels without manipulating the ~~reminder~~ remainder of the coded video stream, i.e. the portion concerning both the higher performance level as well as the lower performance level.

performance level, the data stream comprising consecutive access units of consecutive data packets, each data packet being of a data packet type of a predetermined set of data packet types, at least one of the data packet types being a removable data packet type, and the data packets within each access unit being arranged in accordance to a predetermined order among the data packet types such that even when a data packet of the removable data packet type is removed from the data stream, borders between successive access units are detectable from the data stream by use of the predetermined order, the apparatus comprising means for removing at least one data block of the removable data packet type from the bit stream without manipulating the ~~reminder~~ remainder of the data stream.

In accordance with a third aspect of the present invention, this object is achieved by an apparatus for decoding a data stream representing a coded version of an information signal, the data stream comprising consecutive access units of consecutive data packets, each data packet being of a data packet type of a predetermined set of data packet types, at least one of the data packet types being a removable data packet type, and the data packet within each access unit being arranged in accordance with a predetermined order among the data packet types, such that even when a data packet of the removable data packet type is removed from the data stream, borders between successive access units are detectable from the data stream by use of the predetermined order, the apparatus comprising means for detecting a border between successive access units by use of the predetermined order; and means for decoding the successive access units.

In accordance with a forth aspect of the present invention, this object is achieved by a method for coding an information signal, the method comprising processing the information signal in order to obtain data packets, each data packet being of a data packet type of a predetermined set

of data packet types, at least one of the data packet types being a removable data packet type; and arranging the data packets into a data stream so that the data stream comprises consecutive access units of consecutive data packets, so that the data packets within each access unit are arranged in accordance with a predetermined order among the data packet types, wherein the steps of processing and arranging are adapted so that even when a data packet of the removable data packet type is removed from the data stream, borders between successive access units are detectable from the data stream by use of the predetermined order.

In accordance with a fifth aspect of the present invention, this object is achieved by a method for converting a data stream representing a coded version of an information signal from a first performance level to a second performance level, the data stream comprising consecutive access units of consecutive data packets, each data packet being of a data packet type of a predetermined set of data packet types, at least one of the data packet types being a removable data packet type, and the data packets within each access unit being arranged in accordance to a predetermined order among the data packet types such that even when a data packet of the removable data packet type is removed from the data stream, borders between successive access units are detectable from the data stream by use of the predetermined order, the method comprising removing at least one data block of the removable data packet type from the bit stream without manipulating the ~~reminder~~ remainder of the data stream.

In accordance with a sixth aspect of the present invention, this object is achieved by a method for decoding a data stream representing a coded version of an information signal, the data stream comprising consecutive access units of consecutive data packets, each data packet being of a data packet type of a predetermined set of data packet types, at least one of the data packet types being a removable data

from the data stream on the way from the data stream source to the decoder without incorporation of any hints into the ~~reminder~~ remainder of the data stream. Due to this, decoders surely detect the beginnings and endings of access units and therefore are not liable to a buffer overflow despite a removal of data packets from the data stream before arrival at the decoder.

The removable data packets may be data packets which are negligible or not necessary for decoding the values of the samples in the information signal. In this case, the removable data packets may contain redundant information concerning the video content. Alternatively, such removable data packets may contain supplemental enhancement information, such as timing information and other supplemental data that may enhance usability of the decoded information signal obtained from the data stream but are not necessary for decoding the values of the samples of the informations signal.

However, the removable data packets may also contain parameters sets, such as important header data, that can apply to a large number of other data packets. In this case, such removable data packets contain information necessary for retrieval of the video content from the data stream. Therefore, in case of removal of such data packets, same are transferred to the receiver in another way, for example, by use of a different transmission link or by inserting thus removed data packet somewhere else into the data stream in accordance with the predetermined order among the data packet types in order not to accidentally create a condition in the data stream defining the beginning of a new access unit although being in the middle of an access unit.

Thus, it is an advantage of the present invention that an information signal may be coded into a data stream composed of consecutive data packets, and that removable data pack-

ets may be removed from the data stream without having to manipulate the ~~reminder~~ remainder of the data stream and with, despite this, the order among the data packet types within access units being maintained so that boarders between successive access units are still derivable by use of the order, preferably merely by the knowledge of the order.

Moreover, another advantage of the present invention is the higher flexibility in arranging the data packets in the data stream as long as the arrangement complies with the predetermined order among the data packet types. This allows duplicating data packets for redundancy enhancement and purposes as well as adapting the performance level of the data stream to the receiving or transmission environment.

SHORT DESCRIPTION OF THE DRAWINGS

Preferred embodiment of the present invention are described in more detail below with respect to the Figures.

Fig. 1 shows a schematic diagram illustrating a creation, conversion and decoding of a data stream in accordance with an embodiment of the present invention.

Fig. 2 shows a block diagram of a system in which the procedures of Fig. 1 may be realized in accordance with an embodiment of the present invention.

Fig. 3 shows a block diagram of an encoder environment in accordance with an embodiment of the present invention.

Fig. 4 shows a schematic diagram illustrating the structure of a data stream in accordance with a specific embodiment of the present invention.